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NOVEMBER, 1927

ENTOMOLOGICAL NEWS

Vol. XXXVIII No. 9

JAMES H. B. BLAND,
1833-1911

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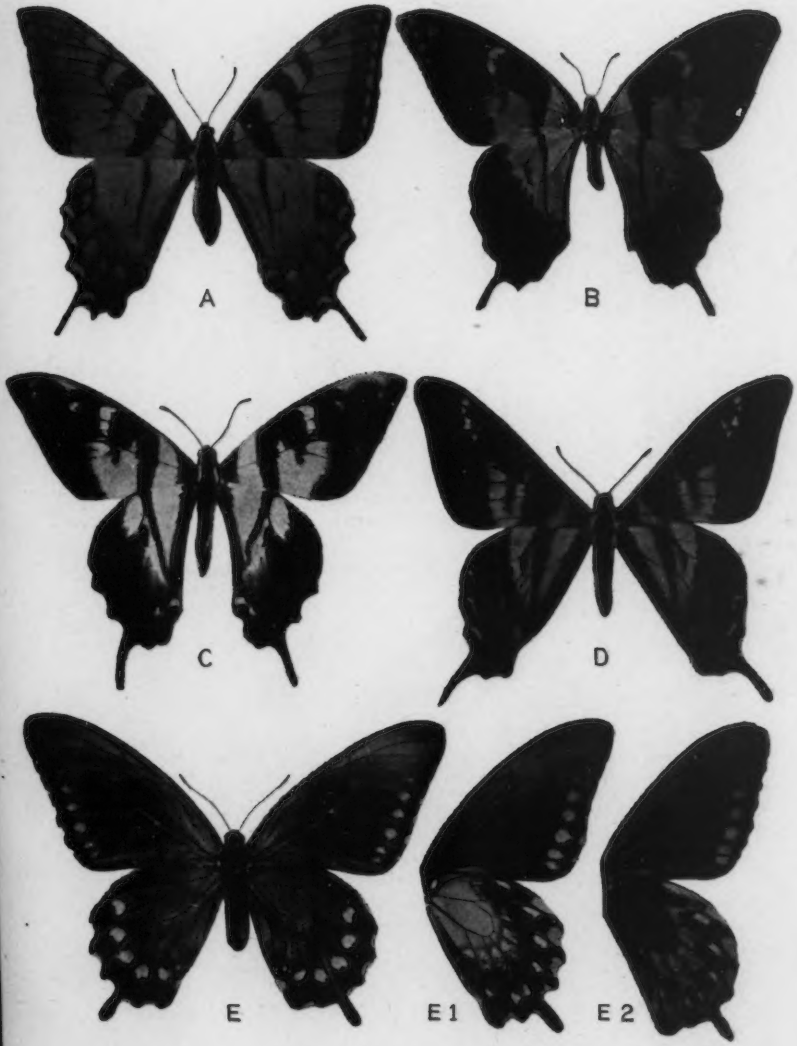

NEW TRANSITION FORMS—GUNDER.

PLATE A.

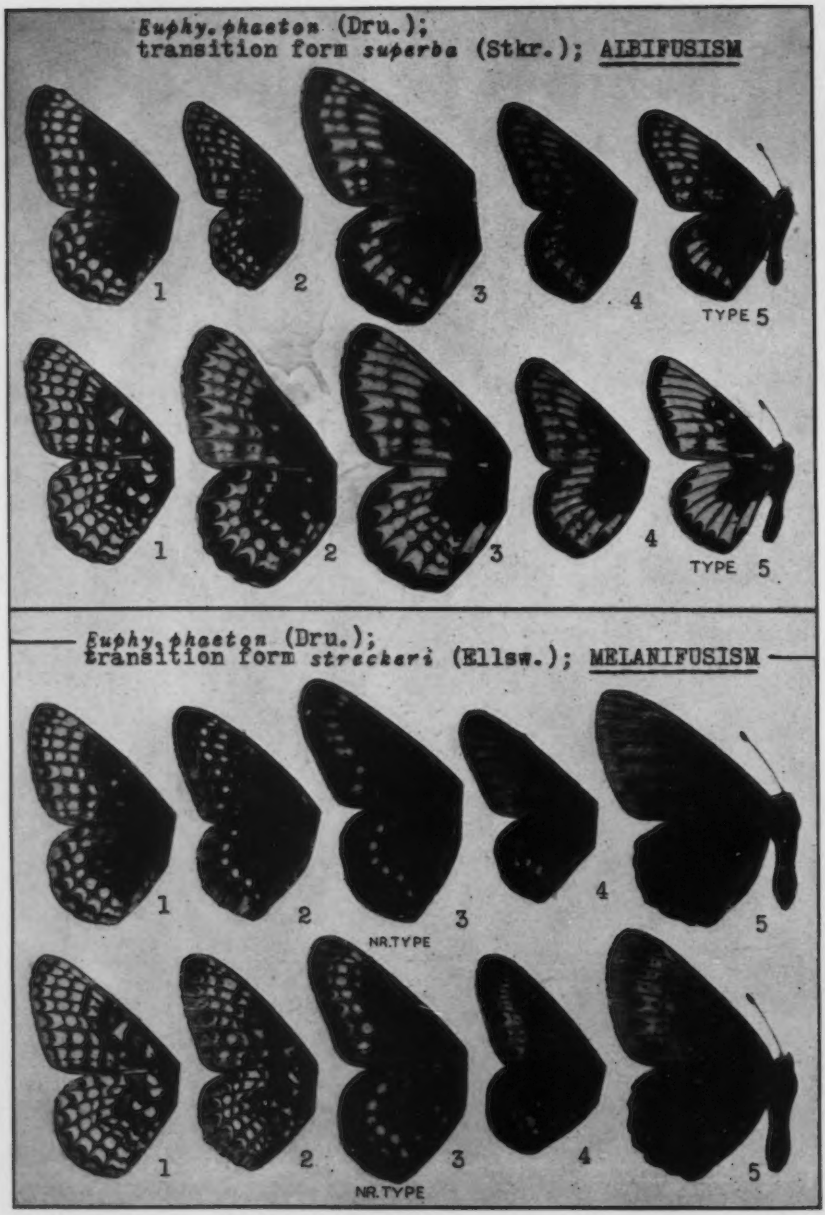

PLATE B.

SEQUENCE OF TRANSITION FORMS—GUNDER.

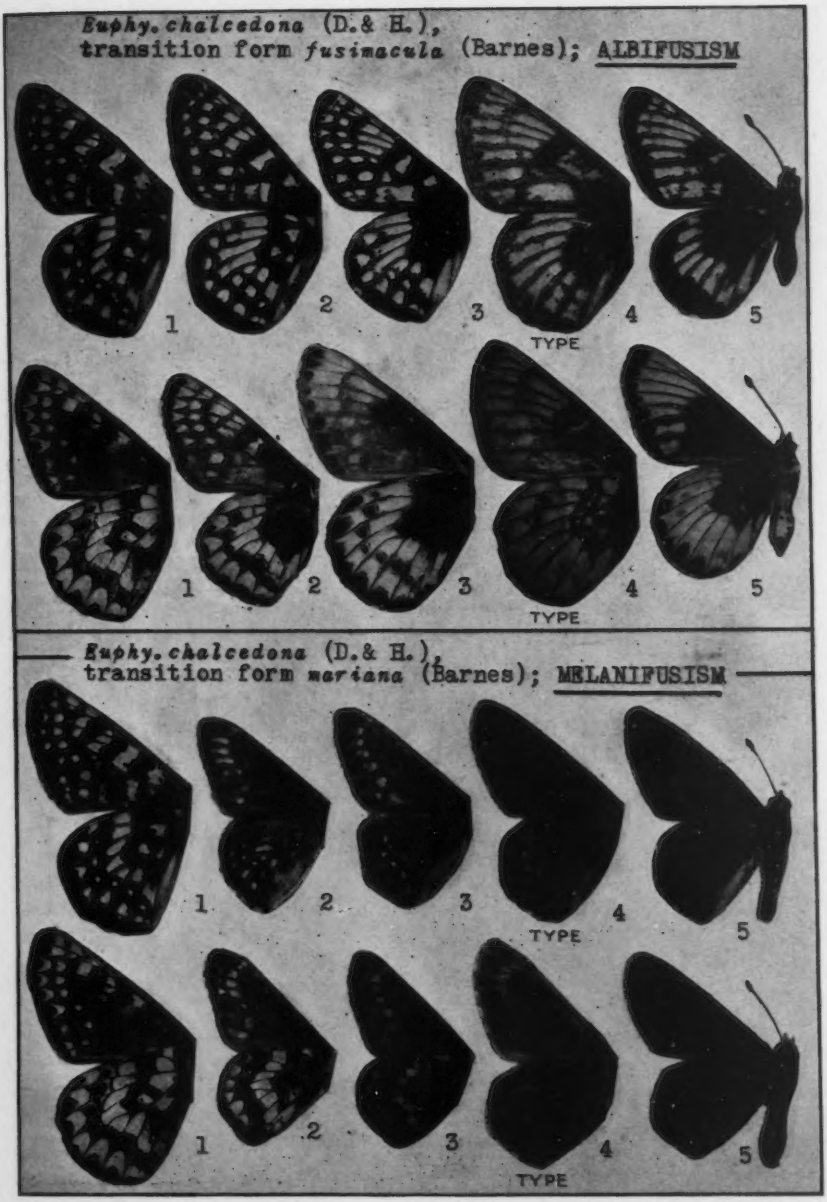

PLATE C.

SEQUENCE OF TRANSITION FORMS—GUNDER.

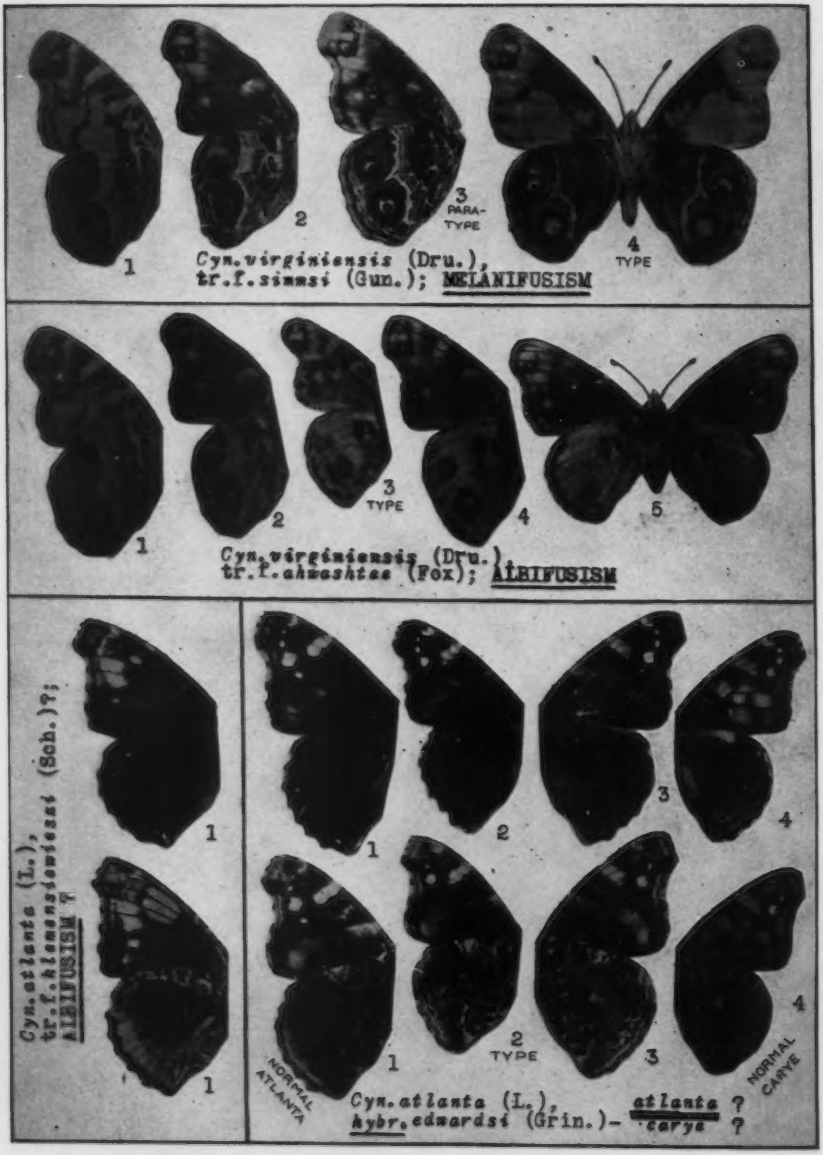

PLATE D.

SEQUENCE OF TRANSITION FORMS—GUNDER.

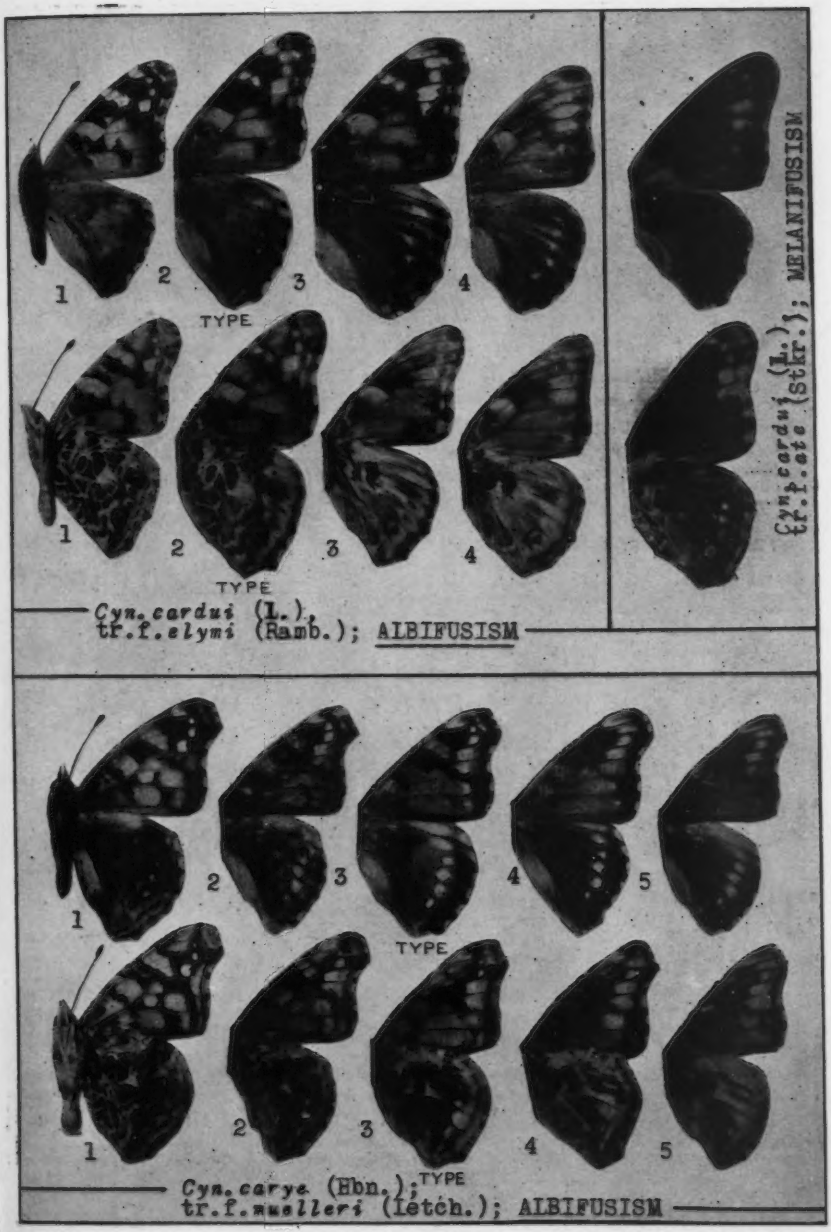

PLATE E.

SEQUENCE OF TRANSITION FORMS—GUNDER.

1. **SPECIES**— . . . . . *SPECIES*
A prime group of individuals reproducing their own in kind.

2. **RACE**—(Subspecies & "variety" being synonymous) . . . . . *RACE*
A digressing near-by group or a separate far-away group of individuals reproducing their own in kind which are constantly similar to, yet consistently atypical of, a predetermined group.

3. **FORMS**—

LOCAL FORM— . . . . . *F. LOC.*
A cognate form whose congenial habitat is definitely restricted to segregated localities within the range of a race or species and generally contagious to them; i. e., altitude or confined desert forms.

GENERAL FORM— . . . . . *F.*
A form occurring quite generally throughout the range of a species or a race. This term is much abused, names being given on slight provocation usually "representing pacific character variance understood by original author."

SEASONAL FORM— . . . . . *F. VERN.* or *F. AEST.*
Forms occurring within a species or race only at certain periods of the year.

SEXUAL FORM— . . . . . *F* ♀ or *F* ♂
Forms belonging to one sex only.

Deviating, cognate individuals or group of individuals bred continually or at cyclic periods within a species or within a race and which are, as a rule, practically counterparts of one another.

*4. **TRANSITION FORM**— . . . . . *F. TR.*
(Normal form—*F. NORM.*, may be used in contradistinction)
Individuals which occur irregularly within a species or within a race and which by change of color or by change of pattern graduate with persistent characteristic similarity from near parental type up to definitely limited variation away from parental type. These may be classified for retention of names as follows:

Change of color—
- melanism—*to black*
- chromatism—*to any spectrum color*
- albinism—*to white*
- pellucidism—*lacking color, iridescent*

Change of pattern—
- immaculism—*lacking design*
- albifusism—*white design radiation*
- chromatifusism—*color design radiation*
- melanifusism—*black design radiation*

HYBRID— . . . . . *HYBR.*
Progeny which have the combined essential characteristics of parents each unlike in specific character relation. (See Zoo. Nom. Rulings re. their designation.)

☛ HERMAPRODITES, DWARFS & GIANTS, PIGMENTAL FLUID MISPLACEMENTS DUE TO CRAMPED (?) PUPA SHELL, VENATION MALFORMATIONS, CHRYSLAS BURNS, WING DISTORTIONS WITH RESULTING PATTERN CHANGE, RUBBED SPECIMENS, SCALELESS, MONSTROSITIES, DEGREASING OR KILLING COLOR CHANGE, FADES, INVERTED WINGS, PARASITIC WING PUNCTURES and all so-called freaks, aberrations, illforms, malforms, deforms and sports.

Names given to specimens which vary from normal due to the above listed lepidopteric inflictions fall into the synonymy and have no classification rating by rank in check lists or catalogues.

In formal description, the terms shown in *red italics* are generally followed with the abbreviation *nov.*, meaning—new; i. e., *species nov.*, *race nov.*, *f. tr. nov.*, etc. To mingle in or use the general words variety or form in their BROAD SENSE OF MEANING when describing in formal language is indefinite, confusing and colloquial. Old time authors were not particular in this regard, hence there is considerable confusion about their classification captions and just what lepidopteric rank they intended for their new specimens.

PLATE F.

*** POSITION OF TRANSITION FORMS IN CLASSIFICATION—GUNDER.**

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Transition Forms (Lepid., Rhopalocera).

By J. D. GUNDER, Pasadena, California.

(Plates V-X).

The transition forms of the order Lepidoptera represent the most tangible and discernible evidence we can offer of gradual evolutionary change taking place within any of the orders of the insect class. Other popular groups, such as Diptera, Coleoptera, Hymenoptera, etc., record little available material along corresponding lines. Their great families seem to have remained longer constant through the decades and their present-day specimens evince small advance alteration of color or pattern as compared with the kindred subdivisions of Lepidoptera when it is considered that all have been subject to the Earth's more recent geographic and climatic changes. Lepidoptera may therefore be considered as among the newer orders because of their more tender subjectivity and more obvious state of flux. For this reason zoologists in recent years have been more inclined to recognize and allow greater flexibility or subdivision of classification for this order.

Moths are generally more constant than butterflies, at least their variants have been less recorded or are less noticeable. Transition forms of butterflies are the occasionally occurring, ultra-developed forerunners, prematurely representative of a potential posterity, which by forcing an average of their style upon their kind, eventually produce a slightly different type of butterfly not unlike unto themselves. Some of these specimens are of extremely futuristic design, while others are only slight advances beyond the mean of their parentage. (See plates VI-IX.). The law of average controls prospective modification, so one cannot say the extreme types furthest away from normal, now found in transition forms, will predominate; rather, it is surmised that the intermediate grades will survive to be represented in the next era. Whether the tentative de-

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velopment is progressive or retrogressive depends upon the stability of the present habitat. Should the environmental change be unusually rapid, the colony is lost; should time allow adaptability, it survives, barring of course other natural causes of elimination. Likewise a long period of no change over an area sustains and increases a colony. This is the case at the broad, flat equator where insects rarely change, only multiply, and where transition forms are scarce, if any exist. So it is in the two temperate or variable zones that most change occurs and phases of these forms may be looked for more commonly. With our present knowledge, it is impossible to state positively that any one particular group of our butterflies are either progressing or retrogressing, however the abundance of one type of transition form over another may give a hint. We know for example there are captured many times more specimens of *Euphy. phaeton* and *chalcedona* showing albifusism than melanifusism. This evidently predicts a lighter-patterned progeny in their future. Whether it represents reversion to a pre-existent status or conversion to an entirely new design is problematical. However, I do not believe there is much evidence ever of an extended or total reversion in nature; everything points to a greater complexity of organism keeping pace with the maturity of all earthly life. Progressive and retrogressive development is manifest by transition forms in two very general ways; one which tends to step-up color sequence or add design, the other which tends to reverse color sequence or suppress design. Occasionally both tendencies are observed in one individual which is interesting, but which has no special significance other than illustrating what was produced by the chance union of opposite well-developed transition forms. The ordinary color gradation in palæarctic butterflies is through white, cream, yellow, orange to red and reverse. Beyond this range, we do not know if the order of a known spectrum is followed or not, nor just where the division of pigmental and refracted colors of scaling starts. Regarding design change, the same tendencies of fusion, broadening, radiation, extension or reverse, or what ever you may call it, occurs in all the

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families from the Papilionidae to the Hesperiidae. Sometimes this radiation is outward, though usually inward, depending upon the present condition of the particular family under observation. Melanism should not be mistaken for melanifusism; the former usually over-casts without design change, while in the latter, the design itself changes. The same difference also applies to chromatism and albinism in distinction to chromatifusism and albifusism. (Note classification order on Plate X).

In sorting out and classifying the transition forms to which names have been given up to date, I find that practically all these specimens have been listed in catalogues and check-lists under the term "ab." [erration.] Also placed under this term, with evident equality by some authors and systematists, are found named "freaks", "dwarfs", "malforms" and various kinds of physically injured and ill-shaped specimens which should not be recognized by a created denominative anymore than a six-toed, pock-marked or birth-marked human being is deserving of a special, specific title for classification. Diagnosis of the condition of these specimens places them in a totally different category from transition forms, though some have a superficial resemblance, especially some distorted wing specimens which may have a protogenic analogy. Authors giving names to such off specimens are not so much to be blamed, considering what the meaning of the term "ab." really is. A summary of dictionary definitions of "aberration" is—*"A wandering deviation from what is right, natural; a mental (or physical) disorder"*. The very meaning of the word, as it stands in our lists, invites authors to name "freakish" specimens!! (See paragraph of mal-lepidopteric symptoms on Plate X). It may be pointed out, therefore, that "ab." is a poor excuse of a word to represent in this day and age a recognized division ofclassification in our Lepidoptera. It is really an old time, lay medical expression, first applied by early entomologists to what they thought were freakish specimens of little biological value or to any specimens which they could not place directly in their cabinets under a species or subspecies. ANYTHING, they could not place, was an "ab."!! So the

word has been handed down to us, for the most part an unchallenged expression, but it is hoped that by discussion and study, it will come into its own true meaning once again and therefore become applicable only for vernacular designation of such specimens as exist outside the pale of possible systematic classification.

EXPLANATION OF PLATE V.

Fig. A. **Papilio glaucus** L., form **turnus** L., tr. f. **dietzi** f. tr. nov.

Similar to *Pap. machaon,* race *britannicus,* tr. f. *evittata* Spengel, as illustrated by Verity. Here there occurs a shading out or loss of the black maculation through the limbal areas on both wings and on both surfaces. With the disappearance of the black on the secondaries, the blues and reds show more conspicuously on the yellow ground color.

Classification: Transition form; immaculism, a medium development.

Data: Holotype ♀, expanse 88mm. Van Courtland Park, New York, (H. Dietz), June 26, 1910. Deposited for future safe-keeping by Mr. Dietz in the coll. of the American Museum of Natural History, New York City. I take pleasure in naming this fine representative specimen after that gentleman.

Fig B. **Papilio glaucus** L., form **turnus** L., tr. f. **gerhardi** f. tr. nov.

Similar in design change to *fletcheri* Kemp (see ill., Can. Ent., Vol. XXII, p. 204, fig. 11) in that the black maculation on both upper and under sides radiates considerably inward, especially through the limbal areas on the secondaries and through the cell and apical areas on the primaries. This specimen is noticeably larger and of a deeper yellow than *fletcheri* type which measures only 75mm. This size and color also make the corresponding difference between *turnus* and race *canadensis.*

Classification: Transition form; melanifusism, well developed.

Data: Holotype ♂, expanse 94mm. Evansville, Indiana

(Evans), no date. In Strecker Coll., Field Museum, Chicago. I take great pleasure in naming this beautiful tr. f. after my old friend, Wm. Gerhard, of the Field Museum, because his real kindness and untiring energy has given to him the respect of all.

Note: Through the help of Dr. McDunnough of Ottawa, I located the type of *fletcheri* Kemp in the Strecker Coll. It is a tr. f. of race *canadensis* R. & J. Another much more developed phase of *fletcheri* is also in the Strecker Coll., labeled Orillia, Ont., Dec. 1896. The Academy Coll. at Philadelphia contains a specimen labeled White River, Ont., and in the Barnes Coll. there are two labeled Bay of Fundy and Lawrence, Mass.

Fig. C. **Papilio rutulus** Luc., tr. f. **fannyae** f. tr. nov.
Similar to tr. f. *fletcheri* of race *canadensis* of *Pap. turnus*, also to tr. f. *radiatus* of *Pap. troilus* and others, in which the black maculation of the limbal areas of both surfaces radiates inward, more especially on the secondaries and through the apical and cell areas of the primaries.

Classification: Transition form; melanifusism, a well marked amount.

Data: Holotype ♂, expanse 90mm. Yoncalla, Oregon (Rees), June 10, 1926. In Author's Coll. Named after Mrs. Gunder, my wife.

Note: M. LeCerf of the Paris Museum has very kindly sent a description (see Bull. Mus. Nat. Hist. Paris, Suppl. t. 2, 25, 1912) and upper and under side photos of his *hospitonina*. I find this type specimen is not a transition form, but a case of wing distortion which has blunted the apex of the primaries and also very slightly deformed the maculation and wing shapes. It is a "freak" which has been mistaken for a tr. form and therefore its name should fall as a synonym directly under the species *rutulus*.

Fig. D. **Papilio eurymedon** Luc., form **albanus** F. & F., tr. f. **columbiana** f. tr. nov.
Similar to tr. f. *fletcheri* of race *canadensis* of *Pap. turnus* and also to others where the black maculation radiates inward on both surfaces through the limbal areas. In this specimen

the extension of the black is more noticeable on the primaries in and near the cell areas.

Classification: Transition form; melanifusism, a medium development only.

Data: Holotype ♂, expanse 85mm. Kaslo, British Columbia, Canada (Cockle), June 28, 1925. In Author's Coll.

Note: A translation of the description of form *albanus* F. & F. lays stress principally upon the light ground color, smallness, etc., without decided reference to the black maculation. Form *albanus* is therefore considered a northern general form of *eurymedon,* for to the southward, the ground color becomes more creamy or yellow. Comstock figures a specimen of form *albanus* from my coll. which is really a first phase of this tr. f., though with not quite so much black fused. Tr. f. *cocklei* Gun. is a case of melanism (black overcasting without design change), whereas this specimen is a case of melanifusism.

Figs. E. and E1. **Papilio philenor** L., race **hirsuta** Skinn. (under side half-fig. e2), tr. f. **inghami** f. tr. nov. The maculation is unchanged on this specimen, but it shows a loss of the blue ground color or blue iridescence over certain areas, particularly around the cell and basal areas on the under side of the secondaries. (Compare fig. E1 with fig. E2). On the primaries there is a noticeable shading out to brownish near the apical part of the limbal area on both surfaces. On glancing through the various illustrations of *Papilio* shown in color by Seitz in his Palaearctic Butterflies, it will be noticed that many kindred species have this brownish shading in conjunction with the bluish iridescent ground color. It may be said, therefore, that *philenor* reaching northward is apt to lose its iridescence, as first evinced by its tr. forms.

Classification: Transition form; pellucidism (lacking iridescent color), probably a near final phase.

Data: Holotype ♀, expanse 87mm. Fairfax, California (Ingham), June 6, 1924. In Author's Coll. Named for Mr. Chas. Ingham of Los Angeles, who first called my attention to the appearance of this specimen.

Note: At first glance, this specimen might be taken for a case of chrysalis burn, but the position and regularity of the changed shading does not warrant this contention.

Not Figured. **Papilio marcellus** Cram., tr. f. **broweri** f. tr. nov.

Same as typical Missouri specimens of this species, except that the red spots at the anal angle on the upper side of the secondaries and also the streak of red running through the discal area on the under side of the secondaries, here become a decided yellow instead of being red.

Classification: Transition form; chromatism, color change red to yellow.

Data: Holotype ♂, expanse 70mm. Willard, Missouri (Brower), June 23, 1918. Deposited for safe keeping in the U. S. National Museum, Washington, D. C. Named after Mr. E. A. Brower, of Willard, Missouri.

EXPLANATION OF PLATES VI-IX.

On these plates are illustrated the commonest transition forms of the family Nymphalidæ. They are all untouched photographs of existing specimens arranged in convenient phases of their transition from normal parentage up to near the extremity of their variance. Both sides of each specimen are shown for comparison and in most cases a photo of the original type specimen, (which stands by reason of priority for the group name), is included. Transition forms of (*Dryas*) *Argynnis* and (*Cynthia*) *Vanessa* are more represented in general collections and are, therefore, of more recognizable interest to readers. Later, I hope to illustrate in the same species other rarer transition forms and also continue to show graphically the practicability and necessity for classification of all transition form specimens along the lines advocated. If these specimens are not subject to some system of classification in the near future, our lists will become as incomprehensible as those now emanating from European sources which, take for example, *Parnassius apollo,* are inflicted with rather more than 150 named "forms," an impossible amount, many of which must be straight synonyms!

Plate VI: (Upper half); ALBIFUSISM: No. 1, *Euphy. phaeton* (Dru.), typical; no. 5, extreme tr. f. *superba* (Stkr.), type.

(Lower half); MELANIFUSISM: No. 1, *Euphy. phaeton* (Dru.), typical; no. 3, approximate type tr. f. *streckeri* (Ellsw.); no. 5, extreme phase.

Plate VII: (Upper half); ALBIFUSISM: No. 1, *Euphy. chalcedona* (D & H.) typical; nos. 2-3, gradations (synonyms) named by Oberthür, Cooledge, Comstock; no. 4, tr. f. *fusimacula* (Barnes), type; no. 5, extreme phase.

(Lower half); MELANIFUSISM: No. 1, *Euphy. chalcedona* (D. & H.), typical; no. 3, nr. gradation (synonym) named by Comstock; no. 4, tr. f. *mariana* (Barnes), type; no. 5, extreme phase.

Plate VIII: (Upper row); MELANIFUSISM: No. 1, *Cyn. virginiensis* (Dru.), typical; no. 4, tr. f. *simmsi* (Gun.), type.

(Middle row); ALBIFUSISM: No. 1, *Cyn. virginiensis* (Dru.), typical; no. 3, tr. f. *awashtee* (Fox), type; no. 5, extreme phase.

(Lower left section); ALBIFUSISM?: This is a tr. f. of *Cyn. atlanta* (L.). I know of none in American collections. This photo was made from a British publication.

(Lower right section); Figs. 2 (type, *edwardsi* Grin.) and 3 show two hybrids of *Cyn. atlanta* possibly with *carye*. Knowing how tr. fs. look in this species, we know that these two specimens are *not* tr. fs. Knowing tr. fs., we are able to distinguish hybrids without the necessity of breed proofing.

Plate IX: (Upper left section); ALBIFUSISM: No. 1, *Cyn. cardui* (L.), typical; no. 2, erroneously printed type, instead of nr. type; however, this figure approaches the original illustration of tr. f. *elymi* (Ramb.); nos. 3 & 4 show extreme phases to which names undoubtedly have been given in Europe, but which will later be unquestionably synonymized.

(Upper right section); MELANIFUSISM: Not numbered. This is Strecker's type of tr. f. *ate*, a rare tr. f. considering that *cardui* is such a plentiful butterfly. European lepidopterists please note this type illustration!

(Lower half); ALBIFUSISM: No. 1, *Cyn. carye* (Hbn.), typical; no. 2, synonym *intermedia* (Grin.); no. 3, tr. f. *muelleri* (Letch.), type; no. 4, synonym *letcheri* (Grin.); no. 5, extreme phase. Up to date, I can record no case of melanifusism for *carye*, though California is its habitat.

Explanation of Plate X.

This plate illustrates the position of transition forms in their relation to other divisions of classification. They, of course, come last, being youngest in point of time. Whether hybrids are really a factor in general development is still unknown. Evidence thus far offered gives them little hope; however, they should be listed as a possible contingency, until such time as it is definitely learned that they do not at all influence general development. If their influence appears negligible now, it may have been considerable in the past and therefore a possibility for the future. I have placed local forms under the term forms and though they are always in geographically isolated colonies, they are still confluent in character and position with their parent stock and their division is closer than that which differentiates species and race.

Regarding nomenclature in general, I quote in part from a letter recently received from N. D. Riley of London which admirably sums up the situation:—

"I do not see how we are ever to arrive at agreement as to the number of degrees of variation, as we overlook the time factor, or perhaps I should say, we cannot include the time factor in any two-dimensional scheme of classification. The old linear system is of course totally inadequate. Yet if we accept the theory of evolution, then our assessment of any group of individuals must make allowance for time; *i. e.,* what evolutionary stage have they arrived at? Consequently, we must admit that there exists today among the insects, not 1, 2, 4, 6, 8, or even 50 different stages of evolution, but an infinite number; and, therefore, I sometimes feel (which may sound strange from a professional systematist) that all our schemes of classification are mere futility. The *safeguard* of course is that *we cannot* recognize all these infinite gradations, and therefore, we are bound for convenience to apply arbitrary standards, and so, by degrees and with much labour, we may eventually arrive at a real *classification of convenience* which will also be *approximately natural.*"

[Corrigenda. We regret that the following errors in Plate X, as furnished us, require correction: Under "Local Form," for "contagious" read "contiguous". Under "General Form," for "pacific" read "specific". For "hermaprodites" read "hermaphrodites". For "chryslas" read "chrysalis".—Editor.]

Concerning Some Published Statements on the Habits of the European Earwig (Orthoptera: Forficulidae).

By B. B. FULTON, Ames, Iowa.

In the Entomological News of October, 1925, (Vol. 36, pp. 234-238) there is an article on the European Earwig, by Milton T. Goe, which gives several impressions which I believe to be misleading and which I think should be corrected in the literature.

In writing about the food of the earwig he gives the impression that they are mainly carnivorous in diet, and that they refuse to feed on any kind of foliage. I have no reason to doubt his statements regarding his feeding experiments, yet I am at loss to know why his caged earwigs refused to eat plant material, unless it could be that there were dead earwigs among them to feed upon. Earwigs (*Forficula auricularia*) prefer meat or sugar to ordinary foliage if given a choice, but in nature plant material forms by far the largest part of their diet. This is especially true in parts of this country where the earwig has become so exceedingly abundant. In such places, if they had to depend on a meat diet, most of them would starve for there would not be enough insects, which they could capture, or enough dead animals to support a tenth of them.

Aside from that it is a simple matter on any warm summer evening to observe, with the aid of a flash light, hundreds of earwigs feeding on plants. No cage experiments are necessary to determine that point.

Mr. Goe also makes the erroneous statement that dwellings would be unmolested by earwigs if reasonable care were exercised not to carry them in. Very few of the earwigs found in houses are carried in but go in of their own accord in search of dark hiding places to pass the daylight hours.

Concerning the use of the forceps, the statement that "to the best of our knowledge they are never used in combat" may be true enough as stated, but is misleading. I have many times seen the European Earwig use the forceps both as an offensive and defensive weapon against other earwigs and against other species of insects.

Mr. Goe also states that in mating the male seizes the female between his wide open forceps. This has never been the case in the many matings I have observed. The male simply slipped the forceps under those of the female with the ventral surfaces of both abdomens in contact, the two earwigs facing in opposite directions. In no case was any attempt made to clasp the female.

On the Biology of the Parasitic Bees of the Genus Coelioxys (Hymen., Megachilidae).

By S. GRAENICHER, South Miami, Florida.

(Continued from page 235).

FIRST STAGE LARVA OF COELIOXYS.

The well-developed first stage larva has a brown head capsule bearing two long and sharp-pointed, sickle-shaped mandibles. These thoroughly chitinized structures, which are so totally different from the corresponding structures in the first stage larva of the hostbee, suggest at first sight weapons to be used in attack or defense, and remind one of similar structures in many predaceous insects. The first stage larvae of *Coelioxys lucrosa* and *C. rufitarsis,* described by the writer in his previous paper, were several days old. Later on, with an ample supply of material on hand, obtained from the nests of *Megachile wootoni,* he has been able to follow up the development of the first stage larva of *Coelioxys ribis* from the time it left the egg until moulting took place.

The newly hatched larva of *Coelioxys ribis* is clear white, with its head slightly broader than the rest of the body.

On the second day it shows a marked increase in size, and a brownish coloration of the middle portion of its body, due to the color of the ingested bee-bread.

On the third day the body is considerably larger and more slender.

On the fourth day the head and mandibles are brown (more heavily chitinized), and the latter have increased considerably in length. At about this age the larva passes out of the slit into the cell on its way up through the bee-bread, to the upper

surface of the latter. After about 24 hours the tips of its long and sharp mandibles appear on top of the bee-bread in the vicinity of the host egg (or young host larva), opening and closing in rhythmical sequence.

Such a larva is extremely aggressive, and is ever ready to attack and destroy either the egg or the larva of the hostbee, or the larva of a rival. The adult parasitic bee is about as large as the hostbee, and this means that in the host's cell there is only enough room and enough food for the development of a single insect of this size. Only one occupant of a cell is destined to survive. The inoffensive larva of the host is destroyed without further ado. When a number of parasitic larvae occur in the same cell, they war among themselves, and, regardless of size, the one that approaches its adversary from behind or from the side is in a position to deliver the fatal bite. The victor partakes of the liquid contents of the victim's body, but after a while withdraws, and continues to feed on bee-bread, its natural food. It retains its aggressive instincts throughout its first stage. Moulting takes place at the end of six or seven days, and removes the heavy chitinous head structures. The resulting second stage larva resembles both in structure and behavior the larva of the hostbee.

A comparison of the exuviae of the first stage larvae of *Coelioxys rufitarsis, C. ribis* and *C. modesta* Sm., shows a difference in length of the mandibles. The last named species of *Coelioxys* is a parasite of *Megachile infragilis* Cr., which constructs its nest cells in hollow upright stems (sumach, burdock, etc.). *C. rufitarsis* has very long and slender mandibles, the length of which amounts to approximately one and one-fourth times the breadth of the head capsule. In *C. ribis* the mandibles are slightly shorter and not quite so slender. *C. modesta* differs considerably from the two just mentioned; its mandibles are hardly half as long as those in *C. rufitarsis*.

Apex of Abdomen in the Females.

The upper and lower plates of the apical segment of the abdomen in various species differ to such an extent in regard to shape, size and position to each other, that these characters

are most useful in the differentiation of the species. It is to be expected that there should be some connection between these structures in a given species and its mode of oviposition. The function of a pointed apex with its long slender lower plate, as we find it in *C. rufitarsis* and other species of our fauna, and *C. quadridentata* of Europe, is explained by the manner in which such a species pierces the wall of the nest cell, and pushes its egg into the opening, as already described. But *C. afra*, another European species observed by Ferton, places its egg on top of the bee-bread, and leaves a slight imprint in the bee-bread, made by the tip of its abdomen. In this bee, the apical plates are broad, the lower one hardly longer than the upper one[7]. *C. texana* Cr. and allied members of the North American fauna possess apical structures of a similar type, and may be found to employ similar methods of oviposition.

First stage Larvae of some other Parasitic Hymenoptera.

In a recent article on "The Bionomics of Dinocampus coccinellae Schrank" Balduf[8] has given us some detailed information concerning the structure, behavior, etc., of this Braconid parasite of ladybeetles. The squarish head capsule of the first stage larva, with its long curved and pointed mandibles (fig. 4, p. 473) resembles to a remarkable extent the corresponding structures in the first stage larva of *Coelioxys*. For purposes of comparison, I wish to call attention to the following points in the bionomics of this Braconid: Superparasitism (often more than one egg of the parasite deposited in the host's body) leads to competition, and, as Balduf informs us, "the first act of these individuals seems to be an attack upon one another." We are further told that "in all cases specifically noted, one larva survived the conflict." The second stage larva presents a different appearance from that of the first stage larva, since "in the moulting process the heavily chitinized head is lost."

This information shows how closely the first stage larva of *Coelioxys* agrees with that of the Braconid, both in regard to

[7] See O. Schmiedeknecht. Die Hymenopteren Mitteleuropas, p. 167.
[8] W. V. Balduf. Ann. Ent. Soc. Am., Vol. 19, pp. 465-498, (1926).

certain structures and behavior. We have in each case the same underlying conditions leading to the same results. There is in the body cavity of the beetle, with its liquid contents, sufficient space and food for the development of one mature Braconid larva, hardly for more than one, a condition that we find parallelled in the nest cell of the leaf-cutter bee with its limited space and supply of bee-bread. In each instance the first stage larvae carry on a fierce struggle among themselves for the undisputed control of space and food supply necessary for the development of one individual.

The first stage larva of *Anastatus* sp. (Eupelmidae) is, according to Parker and Thompson[9], like the same stage in Callimomidae, Eurytomidae and Leucospidae, having a brownish, heavily chitinized head capsule, which changes its shape through moulting, and becomes white (less chitinized). These authors inform us that there are "a number of well-defined larval types within the superfamily Chalcidoidea," and they further state that "these types are readily recognizable only in the primary larvae." This applies also to the parasitic bees of the genus *Coelioxys*, in which the first stage is the characteristic stage in the life of the larva.

Two New Species of Thrips (Thysanoptera).

By GLENN W. HERRICK, Cornell University, Ithaca, New York.

Thrips veratri n. sp.— ♀. Length 1.28 mm. to 1.32 mm.; width of mesothorax .31 mm.; greatest width of abdomen .38 to .39 mm. General color, reddish to smoky-brown with the abdomen somewhat darkest.

Head a little wider than long; wider behind than in front; sides immediately behind the eyes plainly concave; sides and dorsum behind rough with transverse ridges; eyes protruding slightly, black with a row of transparent facets on the edge of each and a few hairs between the facets. One small, sharp, spine on the hind border of each postocular concavity. Ocelli conspicuous, close together, and each bordered with a dark crescent. The ocelli lie between the posterior half of the com-

[9] H. L. Parker and W. R. Thompson. Notes on the larvae of the Chalcidoidea. Ann. Ent. Soc. Am., Vol. 18, pp. 384-398, pl. 26-28 (1925).

pound eyes. Antennae about twice as long as the head; their bases separated by the notched prolongation of the vertex; actual and relative length of segments as follows: 1-22, 2-46, 3-59, 4-59, 5-46, 6-66, 7-21 microns.

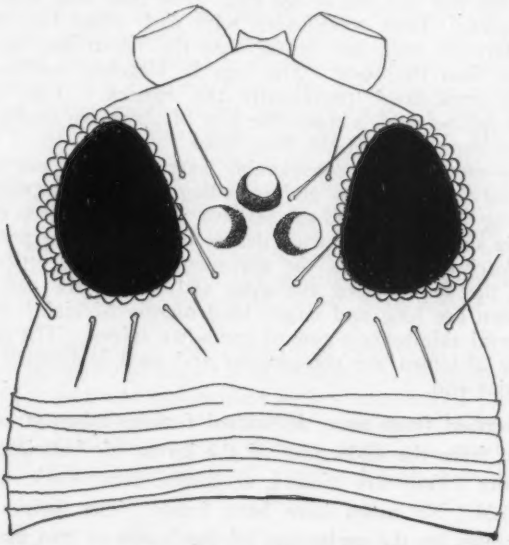

Fig. 1.—Head of *Thrips veratri* n. sp.

Basal segment subglobular, second segment constricted at base, third and fourth fusiform, fifth constricted at base and broadly joined to the sixth which is fusiform while the seventh is short and tapering. Color, one and two dark, reddish-brown, three noticeably lighter, the remaining segments smoky-brown. The segments bear numerous long spines.

Prothorax about one and one-fourth times as wide as the head and about the same length as the head. It is concolorous with the head. There are two long spines at each posterior angle and one short curved spine at each anterior angle. Pterothorax about one and one-third times as wide as the prothorax and slightly longer than it is wide, the mesothorax wider than the metathorax, dorsal surface of mesothorax plainly reticulated. The wings are well developed and distinctly brownish but lighter toward base. The hind wings are lighter than

the front ones. The front vein of fore wing bears a group of seven to eight spines at base, one spine from one-half to two-thirds of the distance from base, one spine about three-fourths of the distance from base and two more spines, one near the end and one at the end. The hind vein bears about ten spines. Legs concolorous with each other but the tibia and tarsi of each are lighter than the femur and somewhat lighter than the body. The legs in bleached specimens are plainly reticulated, particularly the femora. The legs are fairly spinose with a comb-like row of about ten strong spines on the inner sides of the hind tibiae.

Abdomen at base considerably narrower than pterothorax. gradually widening to and including the fifth segment, and tapering sharply beyond the seventh. In general, it is elongate oval in shape and somewhat darker brown than the prothorax. In bleached specimens the abdomen shows the reticulations while the spines along the sides and around the end of the abdomen are long and large; hind margin of eighth segment on dorsal side bears a row of comb-like spines. The pleurites of the abdomen are conspicuous and each is toothed at the posterior end.

Described from many individual females taken at one collection from the undersides of the leaves of American white hellebore (*Veratrum viride*), at Ithaca, New York, on June 27, 1924. No males have been found. The thrips live in the creases on the undersides of the leaves of this plant and have always been in abundance. Indeed most of the leaves are usually found to be seriously injured by the thrips. The epidermis on the underside is usually scarified and destroyed giving the leaves a brown, scorched appearance. The species certainly stands very near *Thrips impar*, but is apparently distinct from the latter although the distinctive characters are difficult to define. The third antennal segment seems lighter than that of *impar* and the whole body darker than that of the latter species.

Cotypes are deposited with the United States National Museum. Others are in the collection of Cornell University, Ithaca.

Microthrips leucus n. sp.—♀. Length 0.82 mm. (0.75 to 0.96 mm.). General color pale, almost white and transparent.

The front wings are considerably darker than the body and the ovipositor, being heavily chitinzed, is conspicuous from its brownish-yellow appearance.

Head, including mouthparts, longer than wide, widest through the eyes (vertex); the cheeks conspicuously convex but narrowing rapidly to the mouth cone; there are two weak pale bristles between the compound eyes, each one just posterior to the base of an antenna; a short pale spine on each cheek just back of each compound eye; the mouthparts reach well backward to the middle of the prothorax and are black at the tip; eyes strongly protruding, coarsely granulate, and conspicuously black with an edging of transparent facets; the ocelli are difficult to detect, the anterior one most prominent and well forward while the posterior ones appear to be wide apart and in line with the hind third of the compound eyes; the maxillary palpi are two-segmented and white. The antennae are seven-segmented, the lengths of the segments are as follows: 1-20, 2-26.4, 3-36, 4-34, 5-33, 6-31.3, 7-36.3 microns.

The first segment is short, wide, and cylindrical, the second is large, globular and ringed with conspicuous chitinous ridges, the third is long and pedunculate with a conspicuous reentrant angular process in side view on the anterior third in which is a long prominent, curved, sensory spine and nearby two prominent straight spines (Fig. 2); the fourth and fifth are

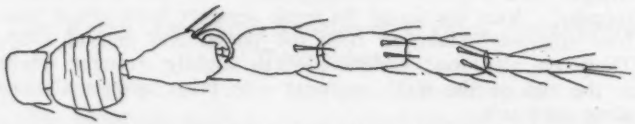

Fig. 2.—Antenna, side view, of *Microthrips leucus* n. sp.

slightly pedunculate; the sixth is cylindrical but tapering somewhat anteriorly while the seventh is long and slender and tapers slightly to the end. Each of the segments bears several conspicuous spines along the sides (Fig. 2). The antennae, as a whole, are brownish and considerably darker than the body and nearly concolorous with the front wings. The first segment is lightest, the second darkest while the remaining ones are nearly of the same shade although there is a slight deepening in color from the third to the seventh.

The prothorax is wider than the head and considerably widest at the posterior margin; there is one weak spine and one fairly strong spine at each posterior angle. The dorsal

side is striated but not strongly so. The pterothorax of about the same width throughout but slightly constricted in the middle and with the posterior angles of the metathorax strongly rounded. The pterothorax is much wider than the prothorax.

The wings reach nearly to the end of the abdomen; fore wings decidedly dark in color, so much so that the specific name might well be nigripennis; they are strong and heavy and thickly beset with rows of very short, black spines; the costal margin bears about 22 long slender hairs on the distal two-thirds with about 12 much shorter spines on the proximal third; the hind vein joins the fore vein at the end of the proximal fifth of the wing and the two anastomosed veins then run very nearly to the tip of the wing considerably nearer the costal than the hind margin; there are five minute spines on the vein widely spaced, the distal one much the largest and strongest. The hind wings are very narrow, nearly transparent whitish with the longitudinal vein decidedly brownish and conspicuous. The legs are concolorous with the body, the ends of the tarsi being somewhat darker; each hind tibia bears two rather stout spines at its inner extremity while each hind tarsus bears one spine in a similar position and a weaker spine opposite.

The abdomen is wider than the pterothorax at the fourth and fifth segments but tapers rapidly beyond to the tenth; tenth as wide at the base as it is long with the sides nearly straight and slightly converging and with the end broadly rounded. Near the tip of the tenth segment there are at least four colorless spines on both the dorsal and ventral sides. There are also four similar, perhaps slightly stronger spines at the end of the ninth segment with other additional ones along each side.

The nymphs of this species are delicate, whitish and almost transparent with the legs and antennae concolorous with the body.

This species clearly falls in the genus *Microthrips,* because of its 2-segmented maxillary palpus, its 7-segmented antennae (1-segmented style) and the anastomosing of the longitudinal veins of the front wings. It is also distinct from the one other species in this genus, *M. piercei* Morg., because of its characteristic delicate, whitish, transparent appearance and its conspicuous dark fore wings which offer a striking contrast to the body as a whole. It is separated from the genus *Leuco-*

thrips by its 7-segmented antennae and by the form and structure of the antennal segments.

The genus *Microthrips* was erected by A. C. Morgan in 1914 and described, together with the one species, *M. piercei,* in the *Proceedings of the United States National Museum,* Vol. 46, p. 19-21, 1914. Figure 28 of the antenna, which Morgan gives in connection with the description of *M. piercei,* answers well for this second new species.

Described from several females taken from a single low-growing, narrow-leaved fern (*Asplenium?*) in the greenhouse at East Lansing, Michigan, by Miss E. I. McDaniel and Mr. Donald Ries on April 20, 1925, at one collection. Hence all specimens are looked upon as cotypes.

Cotypes are deposited in the United States National Museum. Others are retained in the Collection of Cornell University, Ithaca.

I am indebted to Dr. H. Priessner for his courtesy in making an examination of these two species of thrips and in expressing the opinion that they were new species. Also to A. C. Morgan for his trouble in examining the second species and comparing it with *Microthrips piercei.*

The North American Species of Ilybius (Coleoptera, Dytiscidae).

By H. C. FALL, Tyngsboro, Massachusetts.

No table including all our described species of *Ilybius* has ever been offered; which fact, together with the rather monotonous similarity in appearance of the species, has made accurate determinations rather difficult, and led to considerable confusion in many collections. There are, however, a number of good characters, both structural and sexual, and with both sexes present, or at least the male, the student should be able in most cases to make reliable determinations.

Dr. Sharp has shown that the genus may be divided into two nearly equal groups, as follows.

Metatarsal joints in the male distinctly margined externally on their lower edge ..... Group I.
Metatarsal joints of male not so margined Group II.

GROUP I.

This includes the following species—*ater, subaeneus, pleuriticus, inversus, suffusus,* 4-*maculatus,* and *angustior.* Sharp also includes in this group *ignarus* and *fuliginosus.* Of these *ignarus* is so placed in error, as the male hind tarsi are not margined; it belongs to Group II. *Fuliginosus* is a European species doubtfully accredited to our fauna. If taken here it may be recognized by the pale under surface. Of the remaining species of the group, *ater* (*ungularis* Lec.) may probably always be recognized by its very large size (13 mm. or over); the color is black, very feebly or scarcely aenescent. This species must be rare in this country and I have seen only the LeConte type of *ungularis* from Pennsylvania.

Size moderately large, length 10 *to* 12½ *mm.*

Here come *subaeneus, pleuriticus, inversus, suffusus,* and 4-*maculatus.*

Subaeneus differs from all its associates by the lack of the longitudinal apical carina of the last ventral of the male; the last ventral is coarsely, closely, longitudinally striate apically, but without the central carina.

Suffusus may be known by "the whole margin of the elytra broadly and irregularly ferruginous hiding the usual pale spots." The type is from "Indian Territory" and is in the Horn collection. I have not seen it and do not know if there are others in collections.

4-*maculatus* has the last ventral in the male strongly strigoso-rugose at apex, the longitudinal rugae being longest at about the middle of each side of the apex.

Pleuriticus and *inversus* have the apical ventral of the male very little rugose on either side of the short apical carina. These two species are said by Sharp to agree in their sexual characters, but *inversus* is said to be of more convex and less parallel form and to be more coarsely reticulate. I have had the privilege—thanks to Mr. Arrow—of examining a cotype of *inversus* and of comparing it with the type of *pleuriticus* and am more than doubtful of its specific validity.

Size smaller, length 8½ to 9½ mm.

Here comes *angustior* alone. The margined hind tarsi of the male, the small size and narrow form, will probably be sufficient for its distinction. In addition, it may be said that the last ventral of the male is strongly longitudinally rugose in about its apical half, with distinct, short, median carina, and the hind tibiae are strongly punctate over a greater part of their surface than is usual.

GROUP II.

Size small, length 7½ to 9 mm.

Ignarus and *discedens* belong here. They are both rather narrow and black without aeneous lustre.

Ignarus has the last ventral of the male with distinct apical carina but without lateral rugosities.

Discedens has the last ventral of male smooth and without carina at middle, but with some long rather coarse lateral striae.

Size larger, length 9½ to 11½ mm.

Here are included *biguttulus, fraterculus, confusus* and *oblitus.*

In *biguttulus* the last ventral of the male is carinate at apex. With this I include *laramaeus* which is of doubtful validity. The type is slightly smaller and narrower and with the sides a little less evenly rounded than in *biguttulus* and the sculpture of the last ventral (♂) is a little more pronounced, though identical in character. There can I think be scarcely a doubt that *biguttulus* is the same as Say's *fenestralis,* and if so accepted the latter name takes precedence.

Fraterculus, confusus and *oblitus* agree in lacking the carina on the last ventral of the male, and resemble one another closely. They may be distinguished by the degree of approximation of the front margin of the hind coxal plates to the middle coxal cavity; in *fraterculus* this distance is nearly one-half, in *confusus* one-third, and in *oblitus* one-fourth the length of the coxal plate. In the great majority of specimens at least, the submarginal pale spots of the elytra are nearly or quite lacking in *fraterculus;* never so in my experience in *confusus* or *oblitus.*

For rapid consultation the principal characters above noticed are summarized in the following table.

Table of Species.

Metatarsal joints in the male distinctly margined externally on their lower edge .....Group I.
Metatarsal joints in the male not so margined .....Group II.

Group I.

Size very large, 13 mm. or over; black, scarcely aeneous ..*ater.*
Size moderately large, 10 to 12½ mm.
Last ventral of male without median apical carina .....*subaeneus*
Last ventral of male with such carina.
Elytra with broad irregular ferruginous margin .....*suffusus*
Elytra without broad ferruginous margin.
Last ventral of male strigoso-rugose at apex 4-*maculatus*
Last ventral of male very little rugose on either side of the central carina ....*pleuriticus inversus.*
Size smaller, 8½-9½ mm.; form narrow, last ventral of male strongly apically rugose .....*angustior*

Group II.

Size small, 7½ to 9 mm.
Last ventral of male with distinct apical carina but without lateral rugosities .....*ignarus*
Last ventral of male smooth at middle and without carina, but with some rather coarse and long lateral striae .....*discedens*
Size larger, 9½ to 11½ mm.
Last ventral of male carinate at apex .....*biguttulus*
Last ventral of male not so carinate.
Hind coxal plates ½ their length from middle coxal cavities .....*fraterculus*
Hind coxal plates 1-3 their length from middle coxal cavities .....*confusus*
Hind coxal plates 1-4 their length from middle coxal cavities .....*oblitus*

Because of the uncertainty of the identifications in some of the published records it is unwise to attempt to state the pre-

cise limits of distribution of the various species. These are indicated in a general way in the Leng List, but a few additions or amplifications in the case of certain species may here be given, these suggested mainly by my own material—

Subaeneus ranges from Labrador and Newfoundland westward to Manitoba, Alberta and Colorado.

Ignarus: Of this species I have examples from Ottawa, Canada, and from Arlington, New Jersey (Bischoff Coll.).

Angustior crosses the entire continent from Labrador to the Kenai Peninsula in Alaska.

Confusus occurs in both Massachusetts and Connectcut but is not common.

Oblitus. I have taken this species on the Island of Nantucket and have a good series from White Plains, New York, taken by Mr. E. H. P. Squire.

It is quite obvious that the genus is essentially a northern one, and in our fauna overruns British America and Alaska, and occurs in all the states along our northern boundary. In the east only one species—*biguttulus*—descends as far as the latitude of Virginia. Farther west *suffusus* was described from Indian Territory and I have in my collection an example of a species allied to or identical with *biguttulus,* from the Davis Mountains in western Texas.

Exhibition of Lepidoptera.

An exhibition of butterflies and moths will be held in the reading room of the library of The Academy of Natural Sciences, 1900 Race St., Philadelphia, on Wednesday, Thursday and Friday, November 9, 10 and 11, 1927, from 12 to 5 P. M. The star feature will be the exotic collection of Mr. Judson Coxey. Mr. R. C. Williams, Jr., will show a selection from his European series. Mr. F. Haimbach will furnish some moths and some life-histories. Another table will be devoted to specimens from the Academy's collection and there will be some other things of interest. All are welcome.

Change of Address.

C. B. Williams from Ministry of Agriculture, Cairo, Egypt, to Research Institute, Amani, Tanga, Tanganyika, from 1st June, 1927.

New Building at Fayetteville.

The Department of Entomology of the Arkansas University and Station will be housed in a new agricultural building now being erected at a cost of $250,000. (Jour. Econ. Ent.)

The Kansas Entomological Society.

The Kansas Entomological Society held a field meeting on July 3 and 4 at the Sand Hills, Medora, Kansas. Many interesting insects were collected on this trip.

R. L. PARKER, *Secretary.*

Half-Larvae of Flies Obtained by Ligaturing Eggs. (Dipt.: Muscidae).

Under this title (in French), M. Jean Rostand has a note in the *Bulletin* of the Entomological Society of France (1927, No. 10, p. 163) stating that if eggs of *Calliphora vomitoria* are ligatured by a hair, midway between the two poles, say three hours after laying, at a temperature of 15° C., development continues and two half-larvae result, one anterior, the other posterior. The latter it is necessary to extract from the egg envelopes; it makes a few movements but soon dies. The anterior half-larva sometimes left the egg of itself, moved like a normal larva and ate; one of these, consisting of only six segments, was preserved alive for two days. If the ligature be made immediately after oviposition, or during the first hour, development is completely stopped.

Entomological Literature

COMPILED BY E. T. CRESSON, JR.

Under the above head it is intended to note papers received at the Academy of Natural Sciences, of Philadelphia, pertaining to the Entomology of the Americas (North and South), including Arachnida and Myriopoda. Articles irrelevant to American entomology will not be noted; but contributions to anatomy, physiology and embryology of insects, however, whether relating to American or exotic species will be recorded.

The numbers within brackets [ ] refer to the journals, as numbered in the following list, in which the papers are published. The number of volume (in bold face), and in some cases the part, heft, &c. within ( ), follows; then the pagination follows the colon :

All continued papers, with few exceptions, are recorded only at their first installments.

Papers of systematic nature will be found in the paragraph beginning with (N). Those pertaining to Neotropical species only will be found in paragraphs beginning with (S). Those containing descriptions of new forms are preceded by an *.

For records of Economic Literature, see the Experiment Station Record, Office of Experiment Stations, Washington. Also Review of Applied Entomology, Series A, London. For records of papers on Medical Entomology, see Review of Applied Entomology, Series B.

☞ *Note the change in the method of citing the bibliographical references, as explained above.*

Papers published in the Entomological News are not listed.

4—Canadian Ent., Guelph. **6**—Jour., New York Ent. Soc., New York. **9**—Entomologist, London. **10**—Proc.,

Ent. Soc., Washington. **12**—Jour. of Economic Ent. **17**—Ent. Rundschau, Stuttgart. **19**—Bull., Brooklyn Ent. Soc. **22**—Bull. of Ent. Research, London. **30**—Tijdschrift voor Entomologie, The Hague. **47**—Neue Beitr. z. System. Insektenkunde, Berlin. **50**—Proc., U. S. National Museum. **62**—Bull., Amer. Mus. Nat. Hist., New York. **68**—Science. **73**—Eos, Rev. Espanola Ent., Madrid. **77**—Comptes R., Soc. Biologie, Paris. **79**—Koleop. Rundschau, Wien. **80**—Lepid. Rundschau, Wien. **81**—Folia Myrmec. et Termit., Berlin. **105**—Proc. Biological Soc. Washington. **107**—Biologisches Zentralblatt. **111**—Archiv f. Naturgeschichte, Berlin. **116**—Annals of Applied Biology. **118**—Die Naturwissenschaften, Berlin. **122**—Zeit. f. Morph. u. Oekol. Tiere, Berlin. **138**—American Mus. Novitates. **141**—Amer. Naturalist. **145**—Physis, Buenos Aires.

GENERAL.—Baker, C. F., Biographical note. [68] **66**: 229-230. **Davies, W. M.**—Methods for collecting parasites of earwigs. [22] **17**: 347-350, ill. **Hardy, G. A.**—Report on a collecting trip to Garibaldi Part, B. C. [Report of the Provincial Museum of Natural History for the year 1926, Victoria British Columbia] 1927: 15-25, ill. **Heikertinger, F.**—Die ameisenmimese. [107] **47**: 462-501, ill. **Johnson, C. W.**—Biological survey of the Mount Desert region Part 1, The insect fauna. [Mount Desert Island Biological Laboratory]: 21-227. **Müller, Max und W. Schuster von Forstner.** Vulkanausbrüche und Insekten. [17] **44** (6): 22-23. 1927. **Neave, S. A.**—The control of insect pests by means of parasites, [Nature] 1927, Aug. 20: 267-8. **Schade, F.**—Am Serro pelado. [17] **44** (7): 25-26. 1927. **de la Torre-Bueno, J. R.**—Comment on insects in ocean drift or tide line. [19] **22**: 158-162.

ANATOMY, PHYSIOLOGY, ETC.—Bugnion, E.—Les pièces buccales, le sac infrabuccal et le pharynx des Fourmis. [81] **1**: 105-136, il. **Depdolla, P.**—Die Keimzellenbildung u. die Befruchtung bei den Insekten. [Handb. d. Entom. (von Schroeder)] **33.** Lief., Bd. I.: 1073-1116, ill. **Golowinskaja, X.**—Ueber die nachkommenschaft eines durch temperatureinwirkung erzielten intersexen. [107] **47**: 513-516, ill. **Handlirsch, A.**—Die postembryonale Entwicklung. [Handb. d. Entom (von Schröder)] **33** Lief., Bd. I: 1117-1184, ill. **King, R. L.**—A dominant body color in Drosophila repleta. [141] **51**: 480. **Poole, C. F.**—The epistatic effect of vestigial in Drosophila. [141] **51**: 477-480. **Seyser, W.**—Anfängerpräparate X. Chitinpräparate von

der grille (Gryllus campestris). [Micro. f. Naturf.] **5**: 237-242, ill. **Stern, C.**—Ueber chromosomenelimination bei der taufliege. [118] 1927: 740-746, ill. **Whiting, P. W.**—Reversal of dominance and production of a secondary sexual character in the Mediterranean flour-moth. [141] **51**: 450-456.

ARACHNIDA AND MYRIOPODA.—Berland, L.—Contributions à l'étude de la biologie des Arachnides [Archives Zool. Exper. Gener.] **66**, Notes et Revue, No. 1: 7-29, ill. **Emerton, J. H.**—A Maine spider. [Maine Nat] **7**: 35-37, ill. **Willmann, C.**—Ueber oribatiden. [Mikro. f. Naturf.] **5**: 193-200, ill. **Wiehle, H.**—Beitraege zur kenntnis des radnetzbaues der epeiriden, tetragnathiden und uloboriden. [122] **8**: 468-537, ill.

(S) ***Crosby, C. R., and S. C. Bishop.**—Now species of Erigoneae and Theridiidae. [6] 35: 147-154. **2 pl.** ***Mello-Leitao.**—Dios interessantes arachnideos myrmecophilos. [145] **8**: 228-237, ill.

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(N) ***Davis, W. T.**—A new dragonfly from Virginia. [19] **22**: 155-156, ill. ***Ewing, H. E.**—Descriptions of three new species of sucking lice, together with a key to some related species of the genus Polyplax. [10] 29 (5): 118-121. **Ewing, H. E.**—The occurrence of Proturans in western North America. [10] **29**: 146-147. ***Hood, J. D.**—Three new Phlaeothripidae (Thysanoptera) from the District of Columbia. [10] **29** (5): 111-116. 1 pl. **Light, S. F.**—A new and more exact method of expressing important specific characters of termites. [Univ. Cal. Pub., Ent.] **4**: 75-88, ill. **Walker, E. M.**—The Odonata of the Canadian Cordillera. [Prov. Mus. Nat. Hist., Victoria, B. C.] 16 pp.

(S) ***Hood, J. D.**—New Thysanoptera from the United States. [6]. **35**: 123-142. **2 pl.** 927. ***Needham, J. G., and E. Broughton.**—Central American stoneflies, with descriptions of new species (Plecoptera). [6] **35**: 109-120 **1 pl.**

ORTHOPTERA.—Cleveland, L. R.—Natural and experimental ingestion of Paramoecium by cockroaches, [Science] **66**: 222. **Davis, W. T.**—The rearing of pink

katy-dids. [6] **33**: 171-174. **Friedrich, H.**—Untersuchungen über die tibialen sinnesapparate in den mittleren und hinteren extremitäten von Locustiden. [154] **73**: 42-48, ill.

(N) **Caudell, A. N.**—Problems in Taxonomy. [10] **29** (5): 129-132.

(S) **Caudell, A. N.**—Zorotypus longicercatus, a new species of Zoraptera from Jamaica. [10] **29**: 144-145, ill. **Rehn & Hebard.**—The orthoptera of the West Indies. No. 1. Blattidae. [62] **54**: 1-320, ill.

HEMIPTERA.—Hudson, G. V.—Notes on variation in neutral structure of N. Zealand cicadas. [Tr. N. Zeal. Inst.] **58**: 73-74.

(N) ***Drake & Harris.**—Notes on the genus Rhagovelia with descriptions of six new species. [105] **40**: 131-138. ***Knight, H. H.**—New species and a new genus of Deraeocorinae from North America. (Miridae). [19] **22**: 136-143. ***Lawson, P. B.**—The genus Jassus in America north of Mexico. (Cicadellidae). [4] **59**: 167-174, ill.

(S) ***Blanchard, E.**—Aphid notes. [145] **8**: 12-22, 324-337, ill. **Blanchard, E. E.**—Sovre un Tingido nuevo para la fauna argentina. [145] **8**: 361-363, ill. ***Esaki, T.**—An interesting new genus and species of Hydrometridae from South America. [9] **60**: 181-184. ***Funkhouser, W. D.**—New Membracidae collected by the Cornell South American Expedition. [6] **35** (2): 159-164. **1 pl.** ***Goding, F. W.**—New Membracidae. III. [6] **35**: 167-170. **Goding, F. W.**—Revision on the Membracidae of South America and Antilles. [6] **35**: 183-191. ***Hungerford, H. B.**—A new Ramphocorixa from Haiti (Corixidae). [138] No. 278: 2pp. **Pinto, C.**—Spiniger domesticus, n. sp. hemiptere suceur d'insectes, (Reduviidae, subf. Reduviinae). [77] **97**: 833-835.

LEPIDOPTERA.—Frost, S. W.—Notes on the life-history of the four-banded leaf-roller, Eulia quadrifasciana. [4] **59**: 149-152, ill. **Hepp, A.**—Biologische beobachtungen. (Grossschmetterlinge). [80] **1**: 79-80, cont. **Kuehn, A.**—Ueber die änderung des zeichnungsmusters von schmetterlingen durch temperaturreize und das grundschema der Nymphalidenzeichnung. [Nactr. Ges. Wiss., Math-Phys. Kl.] 1926: 120-141, ill. **Noel et Paillot.**—Sur la participation du noyau a la secretion dans les cellules des tubes séricigènes chez le Bombyx du Mûrier. [77] **97**: 764-766.

Philpott, A.—The modification of the eighth sternite in Microdes. [Tr. N. Zeal. Inst.] **58**: 91-92, ill. **Pöhlman, Hans**—Massenflug von Herse convolvuli in alter und neuerer Zeit. [17] **44**: 26-27. 1927. **Rogers, W. P.**—Collecting notes on Eurema lisa (Bdv. & Lec.) in the vicinity of Fall River, Massachusetts. [19] **22**: 125. **Stephan, J.**—Der Schmetterling als Speise. [Der Naturfreund, Detmold] **4**: 266-269. (Also in Unsere Welt, Detmold, **19**: 242-245).

(N) ***Bell, E. L.**—Description of a new race of Pamphilia juba Scudder [6] **35**: 175-176. ***Bird, H.**—A new arrangement and a new generic name in the Gortynid series of the Acronyctinae (Lepidoptera). [6] **35**: 179-182. ***Dyar & Heinrich.**—The American moths of the genus Diatraea and allies. [50] 71, Art. 19: 48-pp., ill. ***McDunnough, J.**—The lepidoptera of the Seton Lake region British Columbia. [4] **59**: 152-162, ill. cont.

(S) **Bouvier, E. L.**—Etude sur les cératocampidés de la collection Charles Oberthür. [Ann. Sci. Nat. Zool.] **10**: 233-288. 3 pl. 6 fig. **Schade, Fr.**—Entomologische Skizzen aus Paraguay. [17] **44**: 23-24. 1927. ***Schaus, W.**—New species of Heterocera from Central and South America. [10] **29**: . 101-111. **Schreiter, R.**—Observaciones biologicas sobre las especies Tucumanas de los generos Dysdaemonia, Rothschildia y Copaxa. [Univ. Nac. Tucuman, Mus. Hist. Nat.] no. 4: 17pp., ill. Sphingidae estudio sobre las especies Tucumanas de esta familia [l. c.] no. 9: 24pp., ill.

DIPTERA.—Aldrich, J. M.—The dipterous parasites of the migratory locust of tropical America (Schistocerca paranensis). [12] **20**: 588-593. **Mueller, R.**—Fliegen als krankheitsüberträger. [Die Umschau, Frankf. a. M.,] **31**: 648-649, ill. **Ribeiro, S.**—A note on a simulid larva found associated with a may-fly nymph. [Jour. & Proc. Asiatic Soc. Bengal] **22**: 69-70, ill. **Smith, K. M.**—A study of Hylemyia brassicae, the cabbage root fly and its parasites. [116] **14**: 312-330, ill.

(N) ***Curran, C. H.**—Some new American Tachinidae. [19] **22**: 144-154. **Curran, C. H.**—Four new American diptera. [138] No. 275: 4pp., ill. ***Huckett, H. C.**—A new kelp fly from Long Island (Fucellia). [19] **22**: 163-165, ill.

(S) ***Brethes, J.**—Notas sobre los Anophelinos argentinos. [145] **8**: 305-315, ill. **Cleare, L. D.**—Notes on the

breeding habits of two mosquitos. [22] **17**: 405-409. **1 pl.** ***Duda, O.**—Die südamerikanischen Drosophiliden unter berücksichtigung auch der anderen neotropischen sowie der nearktischen arten. [111] 1925, A, (11): 1-144, Cont.

COLEOPTERA.—Duncan, D. K.—An unusual condition found in collecting water beetles in Arizona. [19] **22**: 143. **Frers, A. G.**—Metamorfosis de coleopteros argentinos. [145] **8**: 82-92, ill. **Jaques, H. E.**—A preliminary survey of may beetles in Iowa. [Proc. Iowa Acad. Sci.,] **33**: 337-339. **Knaus, W.**—1926 Collecting notes on Kansas Coleoptera. [19] **22**: 126-127. **Rittershaus, K.**—Studien zur morphologie und biologie von Phyllopertha horticola und Anomala aenea. [122] **8**: 1-408, ill. **Spaeth, F.**—Ueber eine den paläarktischen Arten nahe verwandte neue nordamerikanische Cassida. (Cassida relicta). [79] **13**: 112-114.

(N) **Böving, A. G.**—On the classification of the Mylabridae-larvae. (Mylabridae). [10] **29**: 133-142, ill. ***Brown, W. J.**—A revision of the species of Aphodius of Horn's series. [4] **59**: 162-167. ***Fall, H. C.**—A new genus and species of Dytiscidae. [6] **35**: 177-178. **Fisher, W. S.**—A change of name in Anobiidae. [10] **29** (5): 116. **Hardy, G. A.**—Buprestidae of Vancouver Island; Cerambycidae of same, [Rept. Provincial Museum Nat. Hist., 1926, Victoria, B. C.] 1927: 32-34, 34-37, ill.

(S) ***Bruch, C.**—Coleopteros nuevos y poco conocidos. Cerambicidos nuevos o poco conocidos. [145] **8**: 199-211; 338-348, ill.

HYMENOPTERA.—Eidmann, H.—Ameisen und blattläuse. [107] **47**: 537-556, ill. **Jaubert, G. F.**—Sur l'origine de la couleur jaune de la cire des abeilles. [Comptes Rendus, Acad. Sci. Paris.] **185**: 405-6. **Leininger, H.**—Ein lateraler zwitter von Odynerus reniformis (Vespidae). [Verh. Naturw. Ver., Karlsruhe,] **30**: 162-167, ill. **Morison, G. D.**—Acarine disease and the muscles of the honey bee [Nature, London] 1927, Aug. 20: 259-260. **Mukerjee, D.**—Digestive and reproductive systems of the male ant "Dorylus labiatus. [Jour. & Proc. Asiatic Soc. Bengal.] **22**: 87-91, ill. **Plath, O. E.**—Psithyrus laboriosus, an unwelcome guest in the hives of Apis mellifica. [19] **22**: 121-125. **Smith, R. C.**—Observations on Euplectrus platyhypenae How. (Chalcidae), a parasite of noctuid larvae. [19] **22**: 128-134, ill.

(N) **Bertoni, A. de W.**—Nuevos caracteres para la classification de los himenopteres vespoideos. [Rev. Soc. Cien. Paraguay] **2**: 147-148. **Phillips, W. J.**—Two new species of Harmolita [10] **29** (5): 125-129. 1 pl. ***Schwarz, H. F.**—Notes on some anthidiine bees of Montana and California. [138] No. 277: 8pp.

(S) **Stärcke, A.**—Beginnende Divergenz bei Myrmica cobicornis Nyl. [30] **70**: 73-84, ill.

SPECIAL NOTICES.

Students of geographical distribution and other aspects of ecology will find a vast mass of useful meteorological data in "World Weather Records Collected from Official Sources . . . Assembled and Arranged for Publication by H. Helm Clayton." Smithsonian Misc. Collections, vol. 79, Aug. 22, 1927, pp. vii, 1199.

BIOLOGIE DER HYMENOPTEREN, eine Naturgeschichte der Hautflügler, by H. BISCHOFF, Curator at the Zoological Museum of the University of Berlin. Julius Springer, Berlin, 1927. Pp. viii, 598, 224 ills. 27 Reichsmark.—What an entrancing title, and what pleasure we anticipate from the reading of a comprehensive account of the biology of that order of insects which presents such a diversity of habits and whose members have so many interesting structural and physiological adaptations. And in truth, we are not disappointed. The book does give an excellent summarization, in a well organized form, of the information at present available upon the natural history of the hymenoptera. In it materials heretofore widely scattered have been brought together, reorganized to suit the author's scheme of presentation, and given to us in a very condensed but still remarkably readable form. The space given to any special subject is not necessarily in proportion to the quantity of the existing literature, for, as the author explains, in respect to certain topics such as the habits of honey bees and of ants, upon which adequate comprehensive accounts already exist, he has given us only a relatively brief report. Theoretical considerations are usually kept more in the background and unsafe generalizations are avoided. The author discusses, but does not overemphasize, biological adaptations as being useful in explaining the phylogenetic origin of habits, such as parasitism, because of the probability of numerous convergences. At times, however, the author does pause to

tell us of theories essaying to explain the phenomena he is describing, and here we may not always agree with the particular explanation advocated, a circumstance which does not necessarily detract from our interest but rather heightens it. Regarding the building of drone comb by the hive bee, the author agrees with Quelle's theory which states that drone cells, which require more wax than worker cells, are built as the result of an overproduction of wax which in turn is due to a superabundance of bees, or, in queenless colonies, to lack of other employment for the bees which would ordinarily be engaged in nursing the young. Less crowded working conditions at such times are also a factor in allowing the individual cells to become larger in diameter. The author also describes the origin of hexagonal cells,—the building and molding of a circular cell by the bee within it is interfered with by the bees which are shaping the adjacent cells on all sides so that a hexagonal cell results. In the chapter on social organization he largely concurs in Legewie's recent views. The production of workers is explained as being due to underfeeding of the larvae. Since, in the chapter on sexuality, we are told that fertilized bee eggs must contain anlagen capable of developing into either queens or workers, according to the nature and to the amount of food supplied to the larva, it is not clear how these anlagen for worker characteristics, present in the egg, can be due to underfeeding of the subsequent larva. The underfeeding theory must therefore be, as we had already suspected, a theory of the phylogenetic origin of the worker caste. Then Buttel-Reepen's theory, that since more females than drones are produced the extra females must remain spinsters and can help only in rearing the offspring of the fertilized females, a theory which our author rejects, is in its method of reasoning not far removed from that of Legewie. We cannot stop to outline here the practical objections which can readily be made to the above theories individually; since such objections lead only to the formulation of accessory hypotheses on the part of the adherents. The author himself realizes the difficulties encountered in attempting an explanation of the origin of castes. He realizes the necessity of admitting the presence of anlagen for both queen and worker in the same egg but believes that these worker anlagen could not have been laid down in the egg before the worker caste had first come into existence, phylogenetically. But since these workers, said to be first formed by underfeeding, do not reproduce, it is hard to see how they can transmit any of their

characteristics. We see here the difficulties besetting any attempted Lamarckian explanation and yet new Lamarckian theories continue to crop up, not only as an explanation for the castes but also in regard to feeding habits, nest-building, parasitism, etc., theories which are surely not scientific and which often indicate but little more discernment than the older one, that insects acted according to intelligence and reason. Except for the pleasure of thinking them up, the value of such theories remains obscure. The volume is supplied with a table of contents, an adequate subject index and a generic index in which almost six-hundred genera are listed. The page headings are an added convenience to the reader. The bibliography is not intended to be complete but gives preference to the more recent literature. The following chapter headings may serve to indicate the scope of the book. 1. Anatomy, taxonomy, phylogeny, distribution, variation. 2. Locomotion and rest. 3. Nutrition. 4. Respiration and circulation. 5. Nervous system and sense life. 6. Nests of the aculeate hymenoptera. 7. Nests of the social hymenoptera. 8. Eggs and egg-laying. 9. Care of the young. 10. Parasitism. 11. Social life. 12. Sexuality. 13. Ontogeny. 14. Special adaptations, diseases, economic significance.

R. G. SCHMIEDER.

GUIDE TO THE INSECTS OF CONNECTICUT, PART V. THE ODONATA OR DRAGONFLIES OF CONNECTICUT. By PHILIP GARMAN, Ph. D., Assistant Entomologist, Conn. Agric. Exper. Sta. State of Conn. State Geol. & Nat. Hist. Survey, Bull. No. 39. Hartford, 1927. 331 pp., 22 pls., 67+text figs.—In 1917 Dr. Garman published an excellent work on the Zygoptera of Illinois (Bull. Ill. St. Lab. Nat. Hist., xii, art. IV). Having joined the staff of the Connecticut Station some years ago, it is, therefore, eminently appropriate that he should undertake the preparation of the Odonate part of the series on Connecticut Insects which Dr. W. E. Britton is pushing on with commendable energy. As the total number of genera and species treated in this volume is respectively 48 and 164, it has been possible to devote more space to the description of each species than was the case in parts III and IV on the Hymenoptera and Hemiptera respectively; 112 of these species are stated (p. 299) to have been actually recorded from Connecticut. In this connection it may be noted that not all the Connecticut records and species given by Dr. R. H. Howe, Jr., in his *Manual of the Odonata of New England,* are included.

The numbers of species described in this new work is such that the latter will be useful over a large area outside of Connecticut; thus, of the 126 species listed for Indiana by Williamson in 1917 and 1920, 107 are dealt with here. Among the more novel or peculiar features of this book may be noted the view of the close relationship of Odonata, Plecoptera and Neuroptera (p. 17), the degree of curvature of the mesopleural (humeral) suture as separating Cordulinae from Libellulinae (pp. 18, 200), the recognition of the microthorax as one of four thoracic segments (p. 21), of the trochanter as two-segmented (p. 23), the discussion of the nomenclature of the venation (pp. 23-26) and of the relative rank of Agrionidae [Calopterygidae] and Coenagrionidae (pp. 26-27), the use of the labial palpi as the primary character separating the adults of the Libellulidae and Aeshnidae (p. 116), which had been previously done by Ris in a modified form (Cat. Coll. Selys, Libel. pp. 7, 8, 1909), the non-separation of Cordulinae from Libellulinae as such in the keys (pp. 199-200) and the use of Tillyard's tribes in these groups (ibid.). There is a useful bibliography, especially that section of it which lists papers treating of each State of the United States (pp. 296-7). There are many pages of outline figures with, we are glad to observe, the names of the species or genera in close proximity. At the end of the volume are 22 excellent half-tone plates, illustrating whole larvae or whole adults, or details of the structure of both stages. We should not fail to remark that much space in the text is devoted to keys and descriptions of larvae as well as of the imagos. Altogether Dr. Garman has given us a very useful manual and it is in no censorious spirit that we add a list of some corrections which we hope will aid beginners in the study of this group.

P. 30. The name *Boyeria* attached to fig. 7 should be *Basiaeschna* as in the legend at the bottom of the page.

P. 35, footnote. The lack of homology between the inferior appendage of Anisoptera and the inferiors of the Zygoptera was pointed out long before Crampton's paper of 1918, *e. g.*, by Rambur, *Nevroptères*, 1842, p. 14; Calvert, Trans. Amer. Soc. xx, p. 199, 1893.

P. 37. The key to adults, rubric 3, second sentence, "mesopleural suture with a black or dark brown stripe" will not lead orange and olive females of *Ischnura ramburii* and *Anomalagrion hastatum* to these genera as these females have no such stripe (*cf.* p. 43). The corresponding key in the author's *Zygoptera of Illinois*, p. 500, is more cautiously worded.

P. 38. The character given for the separation of the genera *Teleallagma* and *Enallagma,* based on the point of termination of Cu2 must be used with caution for the smaller species of the latter genus.

P. 125. The second sentence, rubric 1, key to adults, seems to be self-contradictory.

P. 129. The word "cross-" has been omitted before "vein" in the fifth line from the bottom and, Dr. Garman adds in a letter, in the first line of the descriptions of adults on pages 126, 141 and 167.

P. 162, line 31. "cephalo-mesal" should be "cephalo-lateral."

P. 171. *Aeshna (Coryphaeschna) ingens* Ramb., of the Gulf States, would fall in *Epiaeschna* by this key to adults.

Pp. 202 (under *Didymops*), 204 (under *Macromia*), 207 (under *Epicordulia*), 241 (under *Libellula*), 292 (under *Pantala*), etc. The term "subtriangle," although not restricted by its definition in the glossary, p. 304, is on these pages applied apparently to the hind wings only. This use of the term is rather unfortunate, as some authors, *e. g.* Kirby, have employed "subtriangular space" to designate the area on the *front* wings which has also been called the "internal triangle."

P. 206. A possible ambiguity in the first rubric of the key to adults might be obviated by inserting in the fifth line the word "not" before "greatly". Some species of *Tetragoneuria (canis, spinosa)* frequently have the triangle of the hind wing with a cross-vein and hence are liable to mislead in rubric 6 of this key.

P. 259. The words "triangle of the" have been omitted from before "front" in line 34.

P. 261-2, key to adults, rubrics 1, 4, and p. 262, generic description of adults of *Erythrodiplax*. The characters drawn from the point of origin of Cu2 and the number of antenodal cross-veins do not apply to many of the species of this genus which are not found in Connecticut.

P. 284, line 8 from bottom. A transverse carina may exist on segment 2, bounding the groove anteriorly.

P. P. CALVERT.

OBITUARY.

GEORGE CHARLES CHAMPION, coleopterist, collector in Guatemala and Panama and secretary for the *Biologia Centrali-Americana,* died August 8, 1927, at Woking, England. We hope to give a fuller notice of his work later.

EXCHANGES

This column is intended only for wants and exchanges, not for advertisements of goods for sale. Notices not exceeding three lines free to subscribers.

These notices are continued as long as our limited space will allow; the new ones are added at the end of the column, and only when necessary those at the top (being longest in) are discontinued.

Wanted—Coleoptera. I wish to purchase correctly named Coleoptera, from North America and Canada. Please send lists. Edwin E. Calder, R. I. College of Pharmacy, 235 Benefit St., Providence, R. I.

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Will exchange and buy butterflies and beetles.—Eugene Denby, 2128 Pensacola Ave., Chicago, Ill.

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For Exchange—Lepidoptera of Georgia for those from other states and countries. Send lists to A. G. Richards, Jr., 498 Prince Ave., Athens, Ga.

Cash for Back Issue—Wanted December issue, Vol. 2, 1891, Ent. News. Name your price; or will buy complete Vol. 2. Mr. J. D. Gunder, 849 Linda Vista Ave., Pasadena, Calif.

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For Exchange—A large number of living cocoons of Actias selene, Philosamia cynthia, etc., in winter. Send for list.—Vee Kung Yu, c/o Bureau of Entomology, Kashing, Chekiang Province, China.

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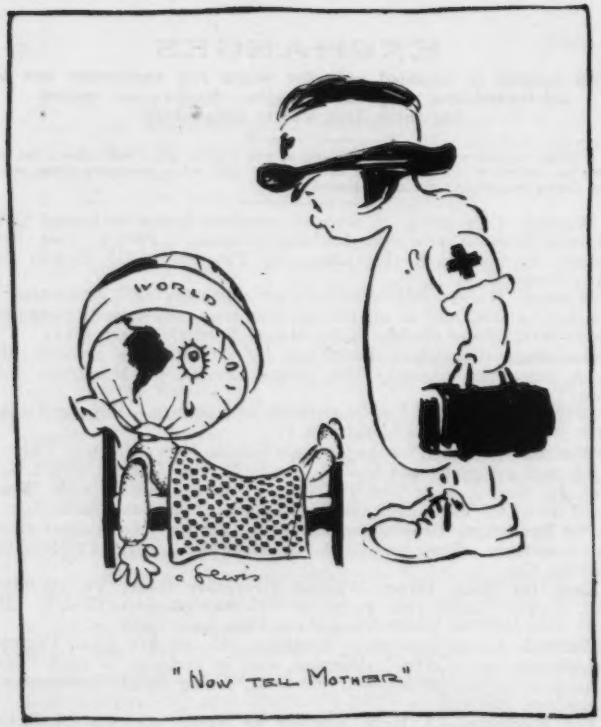

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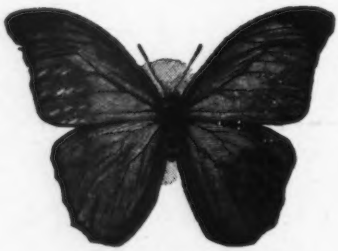

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